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## Reporting of Adherence to Healthy Lifestyle Behaviors among Hypertensive Adults in the 50 States and the District of Columbia, 2013

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### Abstract

Achieving and maintaining a healthy lifestyle is an important part of hypertension management. The purpose of this study was to assess US state-level prevalence of adherence to healthy lifestyle behaviors among those with self-reported hypertension. Using 2013 data from the Behavioral Risk Factor Surveillance System, a state-based telephone survey, we examined the adherence to 5 healthy lifestyle behaviors related to hypertension management: having a “normal” weight, not smoking, avoiding or limiting alcohol intake, consuming the recommended amount of fruits and vegetables, and engaging in the recommended amount of physical activity. We estimated age-standardized percentages of each healthy lifestyle behavior overall and by state, as well as prevalence of all 5 healthy lifestyle behaviors. Overall, the prevalence of healthy lifestyle behaviors varied widely among those with self-reported hypertension: 20.5% had a normal weight, 82.3% did not smoke, 94.1% reported no or limited alcohol intake, 14.1% consumed the recommended amounts of fruits or vegetables, and 46.6% engaged in the recommended amount of physical activity. Overall, only 1.7% of adults with self-reported hypertension reported all 5 healthy lifestyle behaviors, with significant variation by state. Age-standardized prevalence of individuals reporting all 5 healthy lifestyle behaviors ranged from 0.3% in Louisiana to 3.8% in the District of Columbia. In conclusion, adherence to healthy lifestyle behaviors varied among those with hypertension; fewer than 2% reported meeting current recommendations and standards when assessed collectively. Disparities were observed by demographic and descriptive characteristics, including geography.

### Keywords

Hypertension; states; healthy lifestyle; lifestyle intervention; surveillance

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Disclaimer

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## Introduction

Hypertension affects almost 30% adults in the United States<sup>1</sup> and is a major risk factor for heart disease and stroke, the first and fifth leading causes of death in the country, respectively.<sup>2</sup> Although there have been improvements in the awareness and treatment of hypertension over the past decades, the control rate of 51.2% in NHANES 2011–2012 was still below the 61.2% goal in Healthy People 2020.<sup>3,4</sup> The management of high blood pressure requires multiple synergistic interventions, including individual lifestyle behavior changes, regular and timely access to health care providers, and appropriate antihypertensive medication therapy if needed.<sup>5</sup>

Leading a healthy lifestyle, or engaging in heart-healthy behavioral changes, has a documented effect on lowering or controlling blood pressure and is recommended in current national guidelines.<sup>6,7</sup> Lifestyle management of hypertension is an initial intervention for any patient newly diagnosed with hypertension.<sup>8</sup> It is also recommended among those requiring antihypertensive medications, as it enhances medication efficacy and may reduce the number of medications needed to get blood pressure under control.<sup>8</sup> Several healthy lifestyle behaviors have been identified as having an effect on lowering blood pressure, including reducing body weight or maintaining a normal weight, avoiding or limiting alcohol intake, consuming a healthy diet, and engaging in regular physical activity.<sup>5</sup> For overall cardiovascular risk reduction, current guidelines also recommend smoking cessation.<sup>5</sup> Evidence-based guidelines and standards are available for each of these factors.<sup>6, 8</sup> As populations, public health activities, and interventions to improve adoption of healthy behaviors vary across the United States, the assessment of these behaviors at the state level using the Behavioral Risk Factor Surveillance System (BRFSS) may inform specific interventions and communication messages to diverse audiences.

Using the 2013 BRFSS, the objective of this study was to assess adherence to healthy lifestyle behaviors among adults with self-reported hypertension in all 50 states and the District of Columbia.

## Methods

### Data

The BRFSS surveys have been conducted annually since 1984 by state departments of health, with support from the Centers for Disease Control and Prevention (CDC). The BRFSS is the world's largest ongoing telephone health surveillance system, and it tracks health conditions and health-related behaviors in all 50 states, the District of Columbia, and the territories of Guam and Puerto Rico. The survey uses a random-digit dialing methodology to identify adults aged 18 years in the civilian, noninstitutionalized US population. Detailed survey information is available at [www.cdc.gov/brfss](http://www.cdc.gov/brfss).

The current study examined data from the 2013 BRFSS; the median state response rate was 46.4% (range: 29.0%–60.3%).<sup>9</sup> Participants in this study included those with self-reported hypertension. Personal characteristics used to calculate the prevalence of healthy lifestyle

behaviors included self-reported height and weight to obtain body mass index (BMI), tobacco use, alcohol use, consumption of fruits and vegetables, physical activity, and 4 selected demographic characteristics (age, sex, race/ethnicity, and level of education). Self-reported hypertension was defined by answering *yes* to the question, “Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?” Those who answered “borderline or pre-hypertensive” or “female told only during pregnancy” were not classified as having hypertension. The 5 healthy lifestyle factors were defined from a different core section of the BRFSS. Healthy weight was defined as a BMI of 18.5–24.9 kg/m<sup>2</sup> based on self-reported height and weight. Not currently smoking was defined as ever having smoked less than 100 cigarettes or ever having smoked 100 or more cigarettes but not currently smoking. No alcohol or limited alcohol intake was defined as no more than 2 drinks per day for men and no more than 1 drink per day for women. Consuming recommended amounts of fruits and vegetables was defined using previously developed scoring algorithms,<sup>10</sup> which predict whether an individual has consumed the recommended amounts of fruits and vegetables for their age and sex based on the times per day they reported consuming fruits and vegetables, along other individual characteristics, including race/ethnicity and income-to-poverty ratio.<sup>10</sup> Preliminary analysis indicated that only 4.5% of the total BRFSS population consumed recommended amounts of both fruits and vegetables. Thus, for the current study, individuals consuming either the recommended amount of fruits or the recommended amount of vegetables were classified as consuming the recommend amount. Being physically active was defined as reporting 150 minutes a week of moderate-intensity physical activity, 75 minutes of vigorous-intensity activity, or an equivalent combination of aerobic physical activity. The summarized measures of the 5 healthy lifestyle behaviors are shown in Table 1. Demographic variables included age (18–44, 45–64 and 65 years), sex, race/ethnicity (non-Hispanic white, non-Hispanic black, non-Hispanic other, and Hispanic), and level of education (less than high school graduate, high school graduate, some college or technical school, and college graduate or above).

### Statistical Analysis

The 2013 BRFSS survey had 491 773 respondents, and 198 874 reported hypertension. After excluding those who were not residents of the 50 states or the District of Columbia and those with missing information on age, sex, race/ethnicity, education, or any of the 5 healthy lifestyle factors, 164 717 adults with self-reported hypertension were included in the final sample. The prevalence of respondents with each healthy lifestyle behavior and the percentage of those reporting all 5 healthy lifestyle behaviors, as well as those with 0–2 and 4–5 healthy lifestyle behaviors were calculated. Age-specific percentages were estimated. Age-standardized percentages were estimated by sex, race/ethnicity, and level of education using the 2000 US standard projected population,<sup>11</sup> both overall and for the 50 states and the District of Columbia. Gender-specific percentage of adherence to 0–2 and 4–5 healthy lifestyle behaviors were also calculated. Using logistic regression models, we estimated the prevalence ratio of adherence to all 5 healthy lifestyle behaviors for each state adjusting for age, sex, race/ethnicity, and level of education.<sup>12</sup> Louisiana, the state with the lowest percentage of adult adherence to all 5 healthy lifestyle behaviors, was used as the reference. To test the difference of adherence to all healthy lifestyle behaviors across all states, we recoded states based on prevalence ratio, from the lowest (Louisiana) to the highest

(California). We entered this recoded variable into the logistic regression models as continuous variable, and as a categorical variable separately. In logistic regression model to assess the prevalence ratio of adherence 0–2 healthy lifestyle behaviors, California, which had the lowest prevalence rate, was used as reference. Furthermore, in logistic regression model to assess the prevalence ratio of adherence 4–5 healthy lifestyle behaviors, Tennessee, which had the lowest prevalence rate, was used as reference.

All analyses were weighted and the complex survey design of BRFSS was accounted for using SAS-callable SUDAAN (RTI International, Research Triangle Park, NC).

## Results

In 2013, the number of BRFSS participants with self-reported hypertension ranged from 1325 in Alaska to 12 746 in Florida. Overall prevalence of hypertension was 32.5% and varied by state from a low of 24.2% (Utah) to a high of 41.0% (West Virginia). Among those with self-reported hypertension, 20.5% were normal weight, 82.3% did not smoke, 94.1% limited their alcohol intake, 14.1% consumed the recommended amounts of fruits or vegetables, and 46.6% were physically active. Overall, 0.74% (95% confidence interval [CI] 0.65%–0.83%) of respondents reported none of the 5 healthy behaviors, 8.8% (8.6%–9.1%) reported 1 behavior, 38.9% (38.4%–39.4%) reported 2 behaviors, 36.9% (36.4%–37.4%) reported 3 behaviors, and 13.0% (12.6%–13.3%) reported 4 behaviors. Only 1.7% (1.5%–1.8%) of respondents with self-reported hypertension reported adherence to all 5 healthy lifestyle behaviors. Overall, almost half (48.5%) reported adherence to less than 3 (0–2) healthy lifestyle behaviors and only 14.6% reported adherence to 4–5 healthy lifestyle behaviors.

There were disparities in reporting healthy lifestyle behaviors by age, sex, race/ethnicity, and level of education among those with self-reported hypertension (Table 2). In general, those in older age categories, women, those classified as non-Hispanic other race, and those with at least a college education were more likely to report all 5 healthy lifestyle behaviors than their counterparts (based on percentage and 95% CI). For each individual healthy lifestyle behavior, those in older age categories were more likely to report healthy lifestyle behaviors than were younger respondents, except for consuming the recommended amount of fruits or vegetables. Women were more likely to report healthy lifestyle behaviors than were men, except for participating in recommended amounts of physical activity. Sex-specific prevalence showed that only among women, non-Hispanic other had significant higher percentage of reporting 4–5 healthy lifestyle behaviors than non-Hispanic black. This difference was not observed among men (e-Table 1).

By state, the age-standardized prevalence of reporting all 5 healthy lifestyle behaviors ranged from 0.3% in Louisiana to 3.8% in the District of Columbia (Table 3). Age-standardized prevalence of reporting 0–2 healthy lifestyle behaviors ranged from 38.8% in California to 64.0% in Tennessee (e-Table 2). Age-standardized prevalence of reporting 4–5 healthy lifestyle ranged from 6.6% in Tennessee to 22.4% in Arizona (e-Table 3). In general, western states and select New England and Midwestern states reported a higher percentage of adherence to all 5 healthy lifestyle behaviors than did most southern states (Figure 1).

Figure 2 shows the adjusted prevalence ratio of reporting 5 healthy lifestyle behaviors, using Louisiana as the referent. After adjusting for age, sex, race/ethnicity, and level of education, prevalence ratios ranged from a low of 1.42 (95% CI 0.71–2.85), (p value 0.320) in North Carolina to a high of 6.43 (95% CI 3.65–11.35), (p value <0.001) in California. The overall p-value cross all states was <0.001. Prevalence ratios of reporting 0–2 and 4–5 healthy lifestyle behaviors, using the lowest states with prevalence rate were presented in e-Table 2 and e-Table 3, respectively.

## Discussion

The principal finding of this study was that, among adults with self-reported hypertension, the prevalence of reporting each healthy lifestyle behavior ranged from 14.1% (consuming recommended amount of fruits or vegetables) to 94.1% (limiting alcohol consumption). However, among adults with hypertension, the percentage of reporting adherence to all health lifestyles behavior was very low, with only 1.7% reported all 5 healthy lifestyle behaviors. Almost half (48.5%) reported adherence to 0–2 healthy lifestyle behaviors. There were significant differences in reporting healthy lifestyle behaviors by sociodemographic characteristics and by state.

A select number of healthy lifestyle behaviors have been shown to influence blood pressure levels.<sup>5</sup> The American College of Cardiology and the American Heart Association both have a targeted goal of preventing cardiovascular diseases through appropriate treatment for those with increased risk (having hypertension or hypercholesterolemia) using lifestyle management.<sup>6,13</sup> Adherence to these healthy lifestyle behaviors could help prevent hypertension among normotensives and lower blood pressure levels among those with hypertension.<sup>5</sup> Clinical trials have consistently shown the benefits of lifestyle modification for treating hypertension.<sup>14,15,16,17,18,19,20,21</sup> Furthermore, healthy lifestyles could prevent or delay use of antihypertensive medication for grade I hypertension in adults and, among individuals who were using antihypertensive medications, contribute to additional blood pressure reduction<sup>22</sup> and reduce the dosage and number of antihypertensive medications.<sup>8</sup>

Recent national surveillance data found that among those with coronary heart disease, only 17%, 7%, and 21% achieved recommended goals for physical activity, sodium intake, and body weight, respectively.<sup>23</sup> A study based on data from the English Longitudinal Study of Ageing showed that those with hypertension were more likely to report less physical activity and heavy alcohol intake than those without hypertension.<sup>24</sup> US national data showed that, among those with hypertension, only 19.4% adhered to the Dietary Approaches to Stop Hypertension (DASH) eating plan.<sup>25</sup> Using BRFSS data, we found that those with self-reported hypertension were less likely to consume the recommended amounts of fruits and vegetables and to engage in recommended physical activity than were those without self-reported hypertension.<sup>26</sup>

With its large, state-based surveillance system, the BRFSS provides an opportunity to assess healthy lifestyle behaviors among those with hypertension across all 50 states. This study showed that among those with self-reported hypertension, the percentage of those who adhered to all 5 healthy lifestyle recommendations was low (1.7%), and that there was

considerable variation in adherence to each individual healthy lifestyle behavior (more than 90% reported limited alcohol intake, only about 20% maintained a normal weight, and just 14% consumed recommended amounts of fruits or vegetables). Of the 5 healthy lifestyle behaviors, almost half of those with self-reported hypertension (48.5%) reported that they only adhered to 0–2 healthy lifestyle behaviors. Disparities were found by age, sex, race/ethnicity, and level of education as well as by state. Among those with self-reported hypertension, those who were of older age, were female, and had higher levels of education were, in general, more likely to report adhering to healthy lifestyle behaviors than those who were younger, were male, and had lower levels of education. Women who were non-Hispanic other were more likely to report adhering 4 or 5 healthy lifestyle behaviors than non-Hispanic black. Those with self-reported hypertension from southern states were less likely to adhere to the healthy lifestyle behaviors than those in western states or some New England states. These findings are similar to other studies that found a higher prevalence of cardiovascular disease risk behaviors in southern states (e.g., tobacco use<sup>27</sup> and obesity<sup>28</sup>).

CDC is addressing the need to improve the population level adherence to healthy lifestyles through multiple strategies. These strategies are spread across 4 broad domains: enhancement of surveillance systems (monitor behaviors and risk factors); healthy environmental approaches (provide access to healthy foods and a safe environment for physical activity at school, workplace, or community); health care systems interventions (use team-based care to control blood pressure); and community-clinical linkages (promote partnerships between clinical and community organizations to increase access to community-based resources that promote healthy behaviors).<sup>29</sup>

This study has several limitations. All information obtained was based on self-report. Hypertension awareness in 2012 was 82.1%,<sup>30</sup> so perhaps 18% of BRFSS respondents with hypertension were unaware of the condition and might be underrepresented here. In addition, self-reported weight is usually underestimated and self-reported height is usually overestimated, resulting in underestimation of BMI.<sup>31</sup> The assessment of a healthy diet was limited to frequency of fruit and vegetable intake, which was the only dietary assessment in the BRFSS; however, fruit and vegetable intake can be a proxy for healthy eating habits.<sup>32</sup> Methods used to calculate percentages of those consuming recommended amounts may have introduced measurement errors because estimates were based on prediction models.<sup>10</sup> Regardless, as the largest state-based sample survey of self-reported health and health behaviors, BRFSS provides the unique opportunity to report state-level prevalence of adherence to healthy lifestyle behaviors among those with hypertension. Although different definitions were used in this study to estimate the prevalence of adherence to healthy lifestyle behaviors, the reported variations in demographic and descriptive characteristics were, in general, consistent with prior reports.<sup>333435</sup> Those with a higher level of education and who were non-Hispanic other (non-white and non-black) race reported greater adherence to healthy lifestyle behaviors than those with lower levels of education and those of other races/ethnicities.<sup>3336</sup> With the utilization of additional continuous annual survey, trend analyses will be possible to assess the changes of state level estimates in future years.

In conclusion, this study provides recent estimates of adherence to healthy lifestyle behaviors among those with self-reported hypertension for all 50 US states and the District



of Columbia. Although the prevalence of meeting selected healthy lifestyle behaviors was high (80%–90% of the population did not smoke and limited alcohol intake), fewer than 2% met all 5 healthy lifestyle behaviors recommended by the guidelines. These findings provide information that both health care providers and public health practitioners can use to improve their strategies to promote lifestyle modifications among individuals with hypertension. The state-based information in this report can be used by public health practitioners to address prevention of chronic disease, using CDC's 4 domains to promote healthy behaviors at individual and population levels.<sup>27</sup>

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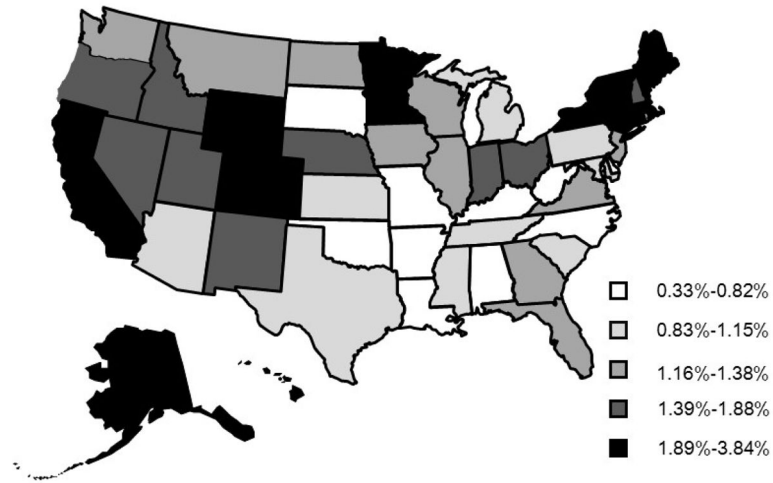
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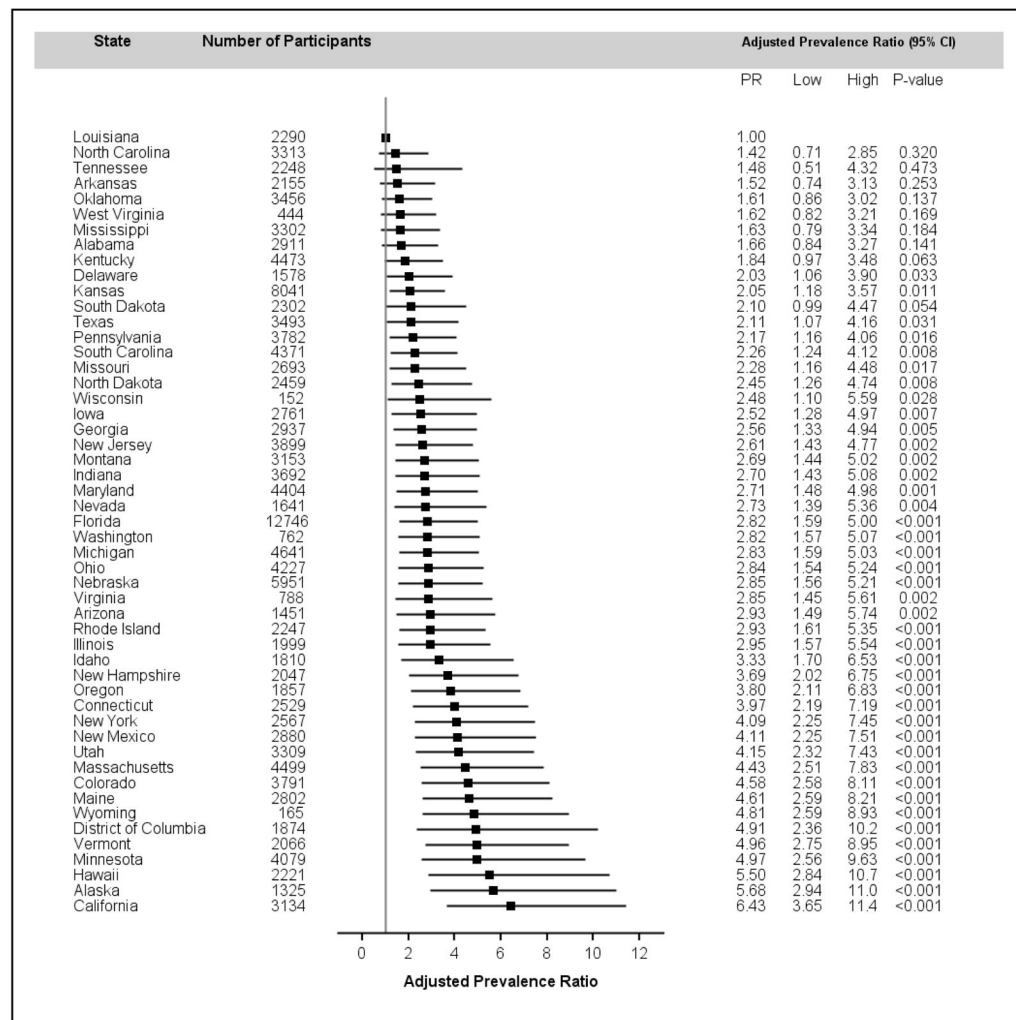
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**Figure 1.**

Age-standardized prevalence of reporting 5 healthy lifestyle behaviors among adults with self-reported hypertension, by quintiles of US states—Behavioral Risk Factor Surveillance System, 2013.

**Figure 2.**

Adjusted prevalence ratios\* of reporting 5 healthy lifestyle behaviors among adults with self-reported hypertension, US states and the District of Columbia—Behavioral Risk Factor Surveillance System, 2013.

Adjusted by age, sex, race/ethnicity and levels of education

P-values represent the tests of each state to the reference state Louisiana based on the t-test

Crossing all states, the overall p-value is <0.001 when using state as either continuous variable or categorical variable

Table 1

## BRFSS Questions and Definitions of Healthy Lifestyle Behaviors

Healthy Lifestyles	BRFSS Question	Measures
Maintain a normal weight	About how much do you weigh without shoes? About how tall are you without shoes?	BMI (kg/m <sup>2</sup> )=18.5–24.9
Not smoking	Have you smoked at least 100 cigarettes in your entire life? Do you now smoke cigarettes every day, some days, or not at all? During the past 12 months, have you stopped smoking for 1 day or longer because you were trying to quit smoking? How long has it been since you last smoked cigarettes regularly?	Had not smoked at least 100 cigarettes in their lifetime; or reported smoking 100 cigarettes in their lifetime but not currently smoking.
No or limited alcohol intake	During the past 30 days, how many days per week or per month did you have at least 1 drink of any alcoholic beverage such as beer, wine, a malt beverage, or liquor?	No or limited alcohol intake was defined for men as drinking less than 2 drinks/day or for women drinking less than 1 drink/day.
Consumed recommended amount of fruits	During the past month, how many times per day, week, or month did you drink 100% PURE fruit juices? Do not include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. Only include 100% juice. During the past month, not counting juice, how many times per day, week, or month did you eat fruit? Count fresh, frozen, or canned fruit.	Usual amount of fruits consumed were calculated from prediction models and compared to US Department of Agriculture Food Patterns age- and sex-specific recommended amounts.
Consumed recommended amount of vegetables	During the past month, how many times per day, week, or month did you eat cooked or canned beans, such as refried, baked, black beans, garbanzo beans, beans in soup, soybeans, edamame, tofu or lentils? Do NOT include long green beans. During the past month, how many times per day, week, or month did you eat dark green vegetables, for example broccoli or dark leafy greens including romaine, chard, collard greens, or spinach? During the past month, how many times per day, week, or month did you eat orange- colored vegetables such as sweet potatoes, pumpkin, winter squash, or carrots? Not counting what you just told me, during the past month, about how many times per day, week, or month did you eat OTHER vegetables? Examples of other vegetables include tomatoes, tomato or V-8 juice, corn, eggplant, peas, lettuce, cabbage, and white potatoes that are not fried, such as baked or mashed potatoes.	Usual amount of vegetables consumed were calculated from prediction models and compared to US Department of Agriculture Food Patterns age- and sex-specific recommended amounts.
Physical activity	During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise? What type of physical activity or exercise did you spend the most time doing during the past month? How many times per week or per month did you take part in this activity during the past month? And when you took part in this activity, for how many minutes or hours did you usually keep at it? What other type of physical activity gave you the next most exercise during the past month? How many times per week or per month did you take part in this activity during the past month? And when you took part in this activity, for how many minutes or hours did you usually keep at it? During the past month, how many times per week or per month did you do physical activities or exercises to STRENGTHEN your muscles? Do NOT count aerobic activities like walking, running, or bicycling. Count activities using your own body weight like yoga, sit-ups, or push-ups and those using weight machines, free weights, or elastic bands.	Did enough moderate or vigorous physical activity to meet the recommendation of 150 minutes a week of moderate-intensity, 75 minutes of vigorous-intensity activity, or an equivalent combination of aerobic physical activity.

Abbreviations: BMI, body mass index; BRFSS, Behavioral Risk Factor Surveillance System.

**Table 2**

Age-Standardized Percentage (95% Confidence Interval) of Adherence to Healthy Lifestyle Behaviors, by Sociodemographic Characteristics—Behavioral Risk Factor Surveillance System, 2013

	N	Normal Weight (BMI 18.5–24.9)	Nonsmoker or Former Smoker	No or Limited Alcohol Intake	Consumed Recommended Amount of Fruits or Vegetables	Engaged in Recommended Amount of Physical Activity	All 5 Behaviors
Total (crude)	164 717	20.5 (20.1–20.9)	82.3 (81.9–82.7)	94.1 (93.8–94.3)	14.1 (13.7–14.5)	46.6 (46.1–47.1)	1.7 (1.5–1.8)
Age-standardized total	164 717	20.9 (20.2–21.7)	77.7 (77.0–78.4)	92.8 (92.3–93.2)	14.2 (13.7–14.8)	47.0 (46.2–47.9)	1.4 (1.2–1.6)
Age (yr)							
18–44	16 181	19.9 (18.7–21.1)	72.6 (71.4–73.8)	91.5 (90.7–92.2)	14.9 (13.9–15.9)	47.3 (45.9–48.7)	1.2 (0.9–1.5)
45–64	65 181	15.9 (15.3–16.4)	78.7 (78.0–79.3)	93.8 (93.4–94.1)	14.9 (14.3–15.5)	43.9 (43.1–44.7)	1.2 (1.1–1.4)
65	83 355	26.4 (25.7–27.0)	91.7 (91.3–92.7)	95.9 (95.6–96.2)	12.6 (12.1–13.2)	49.4 (48.6–50.1)	2.4 (2.2–2.6)
Sex							
Male	71 090	18.7 (17.8–19.7)	77.1 (76.2–78.1)	91.6 (90.9–92.2)	11.6 (10.9–12.3)	49.3 (48.2–50.4)	0.9 (0.8–1.1)
Female	93 627	23.4 (22.1–24.6)	78.4 (77.2–79.5)	94.4 (93.7–95.1)	17.3 (16.3–18.4)	44.3 (42.9–45.6)	2.0 (1.6–2.6)
Race/ethnicity							
Non-Hispanic white	131 970	21.2 (20.3–22.0)	76.0 (75.1–76.9)	91.7 (91.1–92.3)	12.9 (12.3–13.5)	48.6 (47.7–49.6)	1.5 (1.3–1.7)
Non-Hispanic black	17 103	18.0 (16.3–19.9)	78.2 (76.6–79.7)	95.8 (95.0–96.6)	14.2 (12.9–15.6)	42.1 (40.0–44.1)	0.9 (0.6–1.2)
Non-Hispanic other	8606	28.1 (24.9–31.7)	76.6 (73.0–79.7)	95.7 (94.4–96.6)	16.9 (14.2–20.0)	49.3 (45.7–53.0)	2.7 (1.5–5.0)
Hispanic	7038	18.9 (16.6–21.3)	83.8 (81.8–85.7)	92.9 (91.0–94.5)	19.3 (17.1–21.6)	42.5 (39.8–45.2)	1.1 (0.8–1.7)
Education							
<High school	16 434	21.4 (19.3–23.6)	66.4 (63.8–68.7)	93.0 (91.3–94.3)	12.7 (11.1–14.6)	37.1 (34.6–39.7)	0.6 (0.3–0.9)
High school graduate	53 649	19.4 (18.1–20.9)	73.3 (72.0–74.6)	93.0 (92.2–93.7)	12.9 (11.9–14.0)	44.2 (42.7–45.7)	1.1 (0.8–1.4)
Some college	45 562	20.1 (18.9–21.3)	79.0 (77.8–80.1)	92.6 (91.7–93.4)	14.3 (13.3–15.3)	48.6 (47.2–50.1)	1.4 (1.0–1.9)
College graduate	49 072	23.4 (22.0–24.8)	89.9 (88.8–90.9)	92.0 (90.8–93.0)	17.2 (16.1–18.4)	55.7 (54.1–57.3)	2.6 (2.2–3.0)

Abbreviation: BMI, body mass index.

Table 3

Age-Standardized Prevalence%, low and high 95% Confidence Interval of Adherence to Healthy Lifestyle Behaviors, by State—Behavioral Risk Factor Surveillance System, 2013

	N	Maintain normal weight (BMI 18.5– 24.9)			Non-smoker or former smoker			Limited alcohol intake			Consumed recommended amount of fruits or vegetables			Engaged in recommended amount of physical activity			All 5 Behaviors		
		%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95
Alabama	2911	20.2	15.9	25.2	72.3	67.4	76.8	94.9	91.9	96.8	11.4	8.3	15.5	46.0	41.1	50.9	0.8	0.4	1.6
Alaska	1325	17.8	14.0	22.3	72.9	67.8	77.5	91.1	87.9	93.5	14.9	12.2	18.1	51.5	46.5	56.4	2.0	1.2	3.2
Arizona	1451	27.5	20.3	36.1	81.3	75.3	86.2	92.2	87.6	95.2	12.1	8.5	16.8	55.4	47.4	63.2	0.8	0.5	1.3
Arkansas	2155	15.5	12.5	19.0	72.5	67.8	76.7	93.4	90.3	95.6	12.0	9.0	15.9	41.7	36.8	46.7	0.6	0.3	1.3
California	3134	23.7	20.5	27.1	84.3	80.9	87.2	91.6	88.5	93.9	25.3	21.9	29.0	53.9	50.0	57.8	3.2	1.7	6.0
Colorado	3791	25.7	22.7	28.9	78.8	75.6	81.7	92.0	89.9	93.7	14.7	12.7	16.9	58.0	54.6	61.3	2.2	1.5	3.3
Connecticut	2529	19.8	16.2	24.1	76.7	72.0	80.8	90.7	86.6	93.7	16.2	13.3	19.5	47.6	42.7	52.5	1.4	1.0	2.0
Delaware	1874	19.3	15.4	23.9	77.2	72.1	81.6	94.6	91.5	96.7	11.8	9.2	15.1	43.1	38.0	48.4	0.7	0.5	1.1
District of Columbia	1578	23.2	18.0	29.4	79.4	73.4	84.4	94.3	91.6	96.2	17.7	13.4	22.9	55.0	49.9	60.0	3.8	1.5	9.3
Florida	12746	22.1	18.6	26.0	81.3	78.6	83.7	91.3	88.9	93.3	16.0	13.4	19.0	47.0	43.2	50.7	1.3	0.7	2.2
Georgia	2937	22.3	19.2	25.6	79.7	76.6	82.5	95.8	94.4	96.9	12.7	10.7	15.0	44.9	41.3	48.5	1.2	0.7	2.1
Hawaii	2221	23.7	20.4	27.4	82.5	77.9	86.3	91.9	88.9	94.1	14.9	11.7	18.7	56.9	51.6	62.0	3.2	2.0	5.2
Idaho	1810	16.5	12.9	20.9	79.3	73.9	83.8	92.4	88.6	95.0	17.2	13.0	22.3	54.1	48.3	59.8	1.8	0.7	4.5
Illinois	1999	19.7	15.8	24.4	77.2	72.1	81.6	91.8	87.5	94.7	16.7	12.8	21.6	49.5	43.9	55.0	1.2	0.7	2.3
Indiana	3692	19.7	16.5	23.4	75.9	72.3	79.1	94.3	92.4	95.8	14.3	11.7	17.3	41.6	38.0	45.3	1.9	0.9	3.9
Iowa	2761	17.2	13.9	21.1	74.3	69.5	78.6	89.9	85.5	93.1	9.1	7.2	11.6	41.4	36.7	46.2	1.3	0.5	3.6
Kansas	8041	18.3	16.4	20.3	76.4	74.1	78.4	93.5	91.9	94.7	11.0	9.8	12.5	45.7	43.3	48.1	0.8	0.6	1.2
Kentucky	4473	20.4	17.1	24.2	71.3	67.7	74.7	95.1	92.7	96.7	7.5	6.1	9.2	48.8	45.4	52.3	0.7	0.4	1.1
Louisiana	2290	22.1	17.6	27.5	73.8	69.0	78.0	91.8	87.8	94.6	11.8	8.9	15.6	43.6	38.4	49.0	0.3	0.2	0.7
Maine	2802	18.7	15.0	23.0	79.5	75.8	82.8	90.7	87.6	93.1	14.1	11.7	17.0	47.8	43.2	52.4	2.5	1.3	5.0
Maryland	4404	21.3	17.9	25.2	78.5	74.8	81.8	94.4	92.1	96.1	15.8	13.3	18.7	44.6	40.4	48.8	1.1	0.7	1.6
Massachusetts	4499	24.8	21.6	28.3	79.2	75.6	82.4	88.2	84.6	91.1	13.0	11.2	15.1	50.8	46.8	54.8	2.1	1.5	3.0
Michigan	4641	19.2	16.6	22.1	73.3	69.9	76.5	93.0	91.1	94.6	14.0	11.9	16.3	50.0	46.6	53.4	1.1	0.8	1.6
Minnesota	4079	19.7	16.5	23.4	78.1	74.2	81.5	90.2	87.1	92.6	15.4	12.4	19.0	53.3	49.1	57.4	2.8	1.5	5.0



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	N	Maintain normal weight (BMI 18.5– 24.9)			Non-smoker or former smoker			Limited alcohol intake			Consumed recommended amount of fruits or vegetables			Engaged in recommended amount of physical activity			All 5 Behaviors		
		%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95	%	Low 95	High 95
Mississippi	3302	16.9	14.1	20.0	69.6	65.0	73.9	95.8	93.6	97.3	10.1	8.0	12.5	33.5	30.0	37.3	0.9	0.4	2.1
Missouri	2693	15.9	12.8	19.5	73.6	68.5	78.2	92.1	88.2	94.8	10.3	8.0	13.1	46.0	40.8	51.3	0.7	0.5	1.2
Montana	3153	23.4	20.0	27.0	76.9	73.0	80.4	89.5	86.1	92.2	11.9	9.8	14.4	52.1	48.1	56.2	1.3	0.7	2.3
Nebraska	5951	18.1	15.4	21.1	75.0	71.1	78.5	90.4	87.4	92.8	14.7	12.0	17.8	47.4	43.7	51.0	1.7	0.7	4.0
Nevada	1641	17.8	13.0	24.0	71.6	63.9	78.3	91.0	86.8	94.0	16.7	11.4	23.9	54.1	47.4	60.7	1.5	0.8	2.8
New Hampshire	2047	16.8	13.7	20.6	79.7	74.5	84.0	93.1	90.0	95.3	16.8	12.9	21.4	48.7	43.1	54.3	1.7	1.1	2.8
New Jersey	3899	21.6	18.3	25.2	82.3	78.5	85.4	95.9	94.6	96.9	14.9	12.8	17.4	50.8	47.2	54.4	1.2	0.8	1.9
New Mexico	2880	19.0	16.1	22.3	77.6	72.6	81.9	92.8	90.3	94.7	13.1	10.8	15.7	52.1	47.2	56.8	1.7	0.9	2.9
New York	2567	24.3	20.7	28.3	78.1	73.5	82.1	92.7	89.8	94.8	17.7	14.8	21.1	44.1	39.9	48.4	2.2	1.4	3.4
North Carolina	3313	19.6	16.5	23.2	78.5	75.1	81.6	92.9	90.1	94.9	8.2	6.4	10.5	47.2	43.5	50.8	0.5	0.3	0.9
North Dakota	2459	20.7	16.3	26.0	69.2	64.2	73.8	90.0	85.5	93.2	11.8	8.5	16.3	43.8	38.4	49.3	1.3	0.6	2.6
Ohio	4227	19.0	16.3	22.0	71.5	67.8	75.0	92.7	89.9	94.8	11.4	9.4	13.6	46.2	42.5	50.0	1.4	0.8	2.4
Oklahoma	3456	20.4	17.5	23.7	71.5	67.7	75.0	95.4	93.7	96.7	7.5	6.2	9.1	40.0	36.4	43.7	0.8	0.5	1.4
Oregon	1857	25.7	21.6	30.3	78.5	73.1	83.0	89.7	85.4	92.8	14.6	11.4	18.6	59.4	54.1	64.5	1.4	0.9	2.2
Pennsylvania	3782	17.8	15.3	20.5	73.0	69.3	76.4	93.1	90.5	95.1	13.3	11.2	15.7	45.1	41.5	48.8	1.0	0.5	1.9
Rhode Island	2247	20.1	16.1	24.9	77.4	72.0	82.0	94.6	92.4	96.1	16.4	12.2	21.6	45.5	40.3	50.8	1.1	0.8	1.7
South Carolina	4371	17.8	15.3	20.6	76.3	73.0	79.3	94.9	93.2	96.2	12.1	10.0	14.6	44.7	41.2	48.2	1.1	0.7	1.8
South Dakota	2302	13.3	10.7	16.4	78.2	73.3	82.4	93.3	89.7	95.7	9.6	6.9	13.4	54.6	49.0	60.1	0.6	0.4	1.1
Tennessee	2248	17.6	13.4	22.7	68.8	63.6	73.6	94.1	89.3	96.8	5.4	3.8	7.6	33.3	28.3	38.8	0.9	0.3	3.4
Texas	3493	21.0	17.7	24.8	80.6	76.7	84.0	91.8	88.9	94.0	10.8	8.8	13.2	38.5	34.5	42.6	1.1	0.5	2.6
Utah	3309	20.1	17.4	23.0	86.3	83.8	88.5	91.0	88.3	93.1	14.7	12.8	16.7	51.0	47.7	54.3	1.8	1.2	2.5
Vermont	2066	16.4	13.2	20.2	79.2	75.0	82.8	91.0	87.2	93.8	13.8	10.7	17.7	50.3	44.7	55.8	2.7	1.6	4.3
Virginia	2788	20.6	17.5	24.1	75.1	71.3	78.5	92.9	90.1	95.0	15.5	12.9	18.6	49.1	45.2	53.0	1.4	0.6	3.3
Washington	3762	24.0	20.6	27.9	80.9	77.6	83.9	93.1	91.5	94.5	13.3	11.1	15.8	51.4	47.5	55.3	1.2	0.7	1.9
West Virginia	2444	15.4	12.8	18.4	69.1	65.2	72.8	95.7	93.1	97.3	8.7	6.6	11.5	41.8	38.0	45.7	0.6	0.3	1.0
Wisconsin	2152	18.8	14.2	24.5	79.3	74.6	83.4	90.0	85.6	93.2	12.2	8.6	17.0	49.6	43.9	55.4	1.2	0.5	2.8
Wyoming	2165	24.1	19.3	29.7	76.0	69.5	81.4	90.9	84.9	94.6	11.4	8.5	15.1	50.4	44.3	56.6	2.9	1.2	6.9

Abbreviation: BMI, body mass index

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